PENNSYLVANIA RAILROAD, GRANVILLE BRIDGE
Pennsylvania Historic Railroad Bridges Recording Project
Spanning Juniata River, 1.25 miles west of Lewistown
Lewistown
Mifflin County
Pennsylvania

HAER No. PA-534

PHOTOGRAPHS

XEROGRAPHIC COPIES OF COLOR TRANSPARENCIES

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
1849 C Street, NW
Washington, DC 20240

HAER
PA
44-LEWIS,
L

HISTORIC AMERICAN ENGINEERING RECORD

PENNSYLVANIA RAILROAD, GRANVILLE BRIDGE

HAER No. PA-534

Location:	Spanning Juniata River, 1.25 miles west of Lewistown, Mifflin County, Pennsylvania.
USGS Quadrangle:	Lewistown, Pennsylvania (7.5-minute series).
UTM Coordinates:	18/280845/4494430
Date of Construction:	1905.
Basis for Dating:	Plaque on bridge; secondary sources.
Dates of Alteration:	1927, 1950.
Designer:	Pennsylvania Railroad: William H. Brown, Chief Engineer, Alexander C. Shand and F. M. Sawyer, assistant engineers.
Builder:	Eyre Construction Co. (Philadelphia).
Present Owner:	Norfolk Southern Railroad.
Present Use:	Railroad bridge.
Structure Type:	Stone arch.
Significance:	The Granville Bridge is significant as a well-preserved example of a medium-length stone arch bridge, representing the Pennsylvania Railroad's monumental capital investment and desire for "permanent" structures at the turn of the twentieth century.
Historian:	Justin M. Spivey, April 2001.
Project Information:	The Historic American Engineering Record (HAER) conducted the Pennsylvania Historic Railroad Bridges Recording Project during 1999 and 2000, under the direction of Eric N. DeLony, Chief. The project was supported by the Consolidated Rail Corporation (Conrail) and a grant from the Pennsylvania Historical and Museum Commission (PHMC). Justin M. Spivey, HAER engineer, researched and wrote the final reports. Preston M.

Thayer, historian, Fredericksburg, Virginia, conducted preliminary research under contract. Jet Lowe, HAER photographer, and Joseph E. B. Elliott, contract photographer, Sellersville, Pennsylvania, produced large-format photographs.

Description and History

Heading west from Harrisburg in 1847, Chief Engineer J. Edgar Thomson surveyed a route for the Pennsylvania Railroad (PRR) that more or less followed the Pennsylvania Canal over the Allegheny Mountains on its way to Pittsburgh. The canal remained on the Juniata River's north bank, which was usually too narrow for the railroad to share. Thomson's route therefore used the south bank from the Juniata's mouth to Lewistown, a distance of about fifty-five miles. Between Lewistown and Granville, however, a difficult curve in the river made the north bank more favorable. Two long bridges across the river slowed the westward progress of construction, so from 1 September to 24 December 1849, Lewistown was the end of the line.[1]

On the latter date, the first of a succession of structures known as the Granville Bridge opened to traffic. Located 1.25 miles west of Lewistown, it carried a single track on five 120'-0" wooden Howe truss spans. The first Granville Bridge was destroyed by fire and rebuilt in February 1855. A decade later, an unknown contractor erected new two-track iron deck trusses on extensions of the existing stone piers. As part of PRR main line improvements in 1887, the spans were replaced with stronger trusses.[2] Historic photographs show that these were double-intersection Pratt deck trusses. Eye-bars comprising the diagonal and lower chord members were definitely wrought iron; tubular vertical members with elaborate end connections were likely cast.[3] Shortly thereafter, PRR completed third and fourth tracks from the Susquehanna River to the east end of the Granville Bridge, but the two-track bridges at Rockville and Granville continued to limit capacity at either end of this segment. During the spring floods of 1889, the broad Susquehanna failed to dislodge the Rockville Bridge from its piers, but the narrower and faster-flowing Juniata took out four of the Granville Bridge's five spans. Using a combination of new and salvaged trusses, PRR crews managed to put the bridge back in service.[4] Neither the Rockville nor the Granville bridge would last long into the twentieth century, however, as PRR sought to eliminate these two-track bottlenecks from its main line.

The current four-track stone arch bridge at Granville, like the much longer structure at Rockville, reflects PRR's monumental capital investment and desire for "permanent" structures in the early twentieth century. Although Chief Engineer William H. Brown had designed stone arches as early as 1887 at Johnstown, it was a flurry of masonry construction between 1900 and 1906 that earned him a reputation as the railroad's "stone man."[5] Under the leadership of President Alexander J. Cassatt, PRR spent record amounts tunneling under the Hudson River into New York City, separating passenger and freight traffic in eastern Pennsylvania, and upgrading its main line to four tracks across the state. As part of the improvements, Brown and his staff designed notably long and expensive stone arch bridges over the Delaware, Juniata,

Raritan, and Susquehanna rivers.[6] The Granville Bridge is significant as a well-preserved example of a medium-length structure built during this period in the railroad's history.

It is unclear which of Brown's staff might have designed the Granville Bridge, which was built during the 1905 construction season.[7] Many of its details resemble those of the Rockville Bridge completed three years earlier, pointing to design standards for stone arch spans. Even if standards existed, it would have been necessary for a knowledgeable engineer to adapt them to local conditions. The Granville Bridge is possibly the work of Assistant Engineer Alexander C. Shand, who succeeded Brown as Chief Engineer in 1906 and played a large role in construction of another bridge at Mount Union.[8] A plaque on the Granville Bridge lists the names of Brown, Shand, and Assistant Engineer F. M. Sawyer, who supervised construction. The contractor, Eyre Construction Co. of Philadelphia, also receives credit on the plaque.

The Granville Bridge is 56'-0" wide and has eight segmental stone arch spans, each 70'-0" long. Most of the piers are 8'-0" wide, but the middle pier is 16'-0", bringing the total length to 624'-0" between abutments. At Rockville, wider piers occur at intervals to resist unbalanced thrust from an incomplete structure, providing convenient stopping points between construction seasons. The much shorter Granville Bridge was completed in a single year, so its wider middle pier probably serves more of an aesthetic function. With an even number of spans, the bridge has no easily identified center. The subtle difference in width draws the eye to the middle pier and balances the composition. Further emphasis is provided by corbeled projections from the spandrel walls at mid-span, providing 3'-0" by 16'-0" safety niches on either side. These features have a trapezoidal shape in elevation, echoing PRR's trademark keystone.

The Granville Bridge's construction sequence is not well-documented, but because of similar conditions in the Susquehanna and Juniata rivers, can be interpolated with reasonable certainty from the Rockville Bridge. All of the Granville Bridge's piers are founded on rock, which lies just below the shallow river's bottom. As with the Rockville Bridge, the arch rings were probably constructed on wooden truss falsework standing in the river bed. In both bridges, the 42"-thick rings consist of cut-stone voussoirs that contrast with rough ashlar spandrel walls and pier faces. The arches are segmental, with a radius of 40'-7-1/2" and a rise 20'-0" from springing to crown. In his description of PRR structures at Lewistown, historian James J. D. Lynch, Jr., states that the Granville Bridge was built in longitudinal halves, with the westbound tracks "supported in part on the stone piers of the 1889 Bridge."[9] It may be true that each ring was built in longitudinal halves, using the same falsework twice, as with the Rockville Bridge. Neither structure re-used the stone piers of its predecessor, however. At Granville, the old piers still stand upstream of the present bridge. After completing the arch rings, the contractor would have constructed spandrel walls and haunches, which reduce the amount of fill necessary to provide a level rail bed at 7'-0" above the arch crowns. Unlike the unreinforced concrete haunches found at Rockville, as-built drawings of the Granville Bridge show a "grouted rubble backing," which was probably a less expensive material.[10]

Maintenance records indicate alterations in 1927 and 1950. It is unclear on which of these dates steel tie rods were added to the bridge's exterior.[11] This was no doubt done to stop spreading of the spandrel walls and longitudinal cracking in the arch rings. Coping stones have

been covered with reinforced concrete on the upstream side of the bridge. Nonetheless, the Granville Bridge appears today much as it did in 1905. It remains in active service, carrying freight and Amtrak passenger trains.

Notes

1. James J. D. Lynch, Jr., "Lewistown and the Pennsylvania Railroad," *Keystone* 17, No. 3 (Autumn 1984): 10.

2. Lynch, "Lewistown and the Pennsylvania Railroad," 26.

3. See Edwin P. Alexander, *On the Main Line: the Pennsylvania Railroad in the 19th Century* (New York: Clarkson N. Potter, Inc., 1971), 78, or Pennsylvania Railroad scrapbook, 3:187, in Larry Woolsten collection, Railroad Museum of Pennsylvania, Pennsylvania Historical & Museum Commission, Strasburg, Pa.

4. Lynch, "Lewistown and the Pennsylvania Railroad," 26.

5. See U.S. Department of the Interior, Historic American Engineering Record (HAER) No. PA-517, "Pennsylvania Railroad, Conemaugh River Viaduct," 2001, Prints and Photographs Division, Library of Congress, Washington, D.C.

6. "Stone Bridges on the Pennsylvania," *Railroad Gazette* 33, No. 33 (16 Aug. 1901): 580.

7. "Bridges and Buildings," *Railway Age* 39, No. 10 (10 Mar. 1905): 329.

8. See U.S. Department of the Interior, Historic American Engineering Record (HAER) No. PA-529, "Pennsylvania Railroad, Mount Union Bridge," 2000, Prints and Photographs Division, Library of Congress, Washington, D.C.

9. Lynch, "Lewistown and the Pennsylvania Railroad," 27.

10. Pennsylvania Railroad, "Granville Stone Arch Bridge (As Constructed) 1.25 Miles W. of Lewistown Junction," sheet 3 (6 July 1906), milepost 166.86, region/division/branch 402102, aperture card files, Consolidated Rail Corp., Philadelphia, Pa. [transferred to Norfolk Southern Railway Co., Atlanta, Ga.].

11. Correspondence files, milepost 166.86, region/division/branch 402102, aperture card files, Consolidated Rail Corp., Philadelphia, Pa. [transferred to Norfolk Southern Railway Co., Atlanta, Ga.].

Acknowledgment

The author is grateful to Karen L. Aurand, Secretary of the Mifflin County Historical Society, for responding to a preliminary survey form.